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ASSIGNMENT BOOKLET

SCN3240 Chemistry 30

Module 5 Assignment

FOR STUDENT USE ONLY

Date Assignment Submitted:

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Assignment

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Teacher

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Chemistry 30

Learn  veryWare

we explore

Hydrocarbons and the Petroleum Industry Module 5

Assignment Booklet



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FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment		
Lesson 2 Assignment		
Lesson 3 Assignment		
Lesson 5 Assignment		
Lesson 6 Assignment		

Teacher's Comments

Chemistry 30 Learn EveryWare
Module 5: Hydrocarbons and the Petroleum Industry
Assignment Booklet
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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	



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- Alberta Education, <http://www.education.gov.ab.ca>
- Learning Resources Centre, <http://www.lrc.education.gov.ab.ca>
- Tools4Teachers, <http://www.tools4teachers.ca>

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Read all parts of each assignment carefully, and record your answers in the appropriate places. If you have difficulty with an assignment, review the relevant sections of the lesson and the textbook. Be sure to proofread your answers carefully before submitting your Assignment Booklet.

MODULE 5: LESSON 1 ASSIGNMENT

Lesson 1 Assignment: Careers in the Petroleum Industry

1. Identify a job in or related to the petroleum industry that interests you. Research the job and create a short write-up that includes the following information:

- brief job description
- education requirements
- duties performed
- locations where the job is performed
- salary
- future career prospects

Indicate and justify whether the job is directly or indirectly related to the petroleum industry.

MODULE 5: LESSON 2 ASSIGNMENT

Lesson 2 Assignment: Alkanes

1. Read "Explore an issue" on page 365 in the textbook. Then, go to www.science.nelson.com and read the associated information posted under Unit 5, Chapter 9.2, Weblinks. Ask your teacher if you need help locating the information on the website.

Research, from a variety of perspectives, the pros and cons of coalbed methane extraction in Alberta. Provide your research notes in the space below.

2. Decide whether you are for or against the resolution stated on page 365. Use the information you collected in question 1 to support your position.

MODULE 5: LESSON 3 ASSIGNMENT

Lesson 3 Assignment: Alkenes and Alkynes

1. Complete "Section 9.3" question 1 parts a–c on page 380 of the textbook.
2. Complete "Section 9.3" question 2 on page 380 of the textbook.
3. Complete "Section 9.3" question 4 on page 380 of the textbook.

4. Complete "Section 9.3" question 5 on page 380 of the textbook.

5. Complete "Section 9.3" question 6 parts a–e of on page 380 in the textbook.
6. Complete "Section 9.3" question 7 parts a–f on page 380 in the textbook.
7. Draw condensed chemical structures and structural formulas for the following hydrocarbons:
 - a. 3-ethyl-4-methylpent-2-ene
 - b. 5-ethyl-2,2,6-trimethylhept-3-yne

MODULE 5: LESSON 5 ASSIGNMENT

Lesson 5 Assignment: Alberta's Oil Industry

1.
 - a. What physical property of hydrocarbons is used for fractionation?
 - b. What chemical theory explains the difference in the physical property used for fractionation?
2. The following table is based on "Table 1" on page 387 of the textbook. For each row of data, identify all of the products you have used and classify each one as an essential, useful, convenient, or luxury item.

Fraction (intermediate product)	Products Used	Classification
Gases; LPGs		
Naphthas		
Straight-Run Gasoline		
Kerosene		
Light Gas or Fuel Oil		
Heavy Gas Oil		
Greases		
Paraffin Waxes		
Unvapourized Residues		

3.
 - a. Why does crude oil have to be chemically processed as well as fractionated?

- b. How would society and/or society's technologies be different without the invention of these processes?
4. The conceptual understanding of any phenomenon in science usually starts with the creation of a classification system. Classify and write condensed structural formula equations for each of the following organic reactions. Catalysts are involved in all reactions other than combustion.
- a. ethane $\rightarrow$ ethene + hydrogen
- b. hexane $\rightarrow$ benzene + hydrogen
- c. 4,4-dimethylpent-2-yne + hydrogen $\rightarrow$ propene + methylpropane

d. methylbenzene + oxygen $\rightarrow$ carbon dioxide + water vapour

e. nonane $\rightarrow$ 1-ethyl-3-methylbenzene + hydrogen

f. $\text{CH}_3(\text{CH}_2)_{16}\text{CH}_3$ + hydrogen $\rightarrow$ nonane + octane + methane

5. What is the difference between the following substances?

a. bitumen and crude oil

b. synthetic and conventional crude oil

6. In addition to alkanes, cracking reactions may also involve alkenes, alkynes, and aromatics. For each of the following reactions, draw a structural formula equation. Include all reactants and products.

a. but-1-ene $\rightarrow$ ethyne + ethane

b. 3-methylheptane $\rightarrow$ but-2-ene + butane

c. 3-methylheptane $\rightarrow$ propene + 2-methylbut-1-ene + hydrogen

d. propylbenzene $\rightarrow$ benzene + propene

MODULE 5: LESSON 6 ASSIGNMENT

Lesson 6 Assignment: Environmental Impact of Fossil Fuels and Alberta's Oil Industry

1. The primary reaction of the components of natural gas is combustion with oxygen from the air. The primary product of these combustion reactions is energy. List three chemical by-products of this energy-producing reaction.

2. Write molecular and condensed structural formula equations for the combustion of pentane (in winter gasoline). Assume complete combustion.

3. Evaluate, with reasoning, the following statement:

"Fossil fuels must contain significant quantities of nitrogen because nitrogen oxides are found in the exhaust of cars and trucks."

4. Combustion is not always complete, usually because of an insufficient supply of oxygen. Write a hypothesis, including a chemical equation, to explain the following events.
 - a. When ethyne (acetylene) is burned in air, black soot appears.

 - b. Deaths have occurred when charcoal briquettes (assume pure carbon) are burned inside a tent to keep campers warm on a cold night.

- c. Deaths have occurred when people fall asleep in the back seat of a car that has a leaky muffler.
5. Gasoline is not a mixture of pure hydrocarbons. Some of the hydrocarbon molecules are contaminated with nitrogen, sulphur, and oxygen atoms. Air pollutants, such as nitrogen dioxide and sulfur dioxide, are produced from the combustion of these molecules. Write unbalanced chemical equations to represent the complete combustion of the following:
- a. $\text{C}_6\text{H}_5\text{NO}(\text{l})$
- b. $\text{C}_4\text{H}_8\text{S}(\text{l})$
- c. $\text{NHC}_3\text{H}_4\text{S}(\text{l})$

